

Food additives

I wonder how many people visiting a fishmonger realise that the colour of many fresh salmon is due to the presence of an artificially added colour. The flesh of wild salmon is pigmented with astaxanthin, which is obtained naturally from crustacea in their diet. Another colour, canthaxanthin, is added to the diet of farmed salmon to produce fish equivalent in colour to wild salmon.¹ Many people are probably also unaware that titanium dioxide is added at a concentration of up to 400 mg per kilogram to Mozzarella cheese made from cows' milk, in order to give this product the same white appearance as traditional Mozzarella cheese made from buffalo milk.¹ The scale of use of additives in food comes as a surprise to most people, and it is understandable that many should find these substances vaguely menacing.

Types of additives

Concern about food additives is not new. In 1857, a survey of adulterants in food showed that childrens' sweets were commonly coloured by red lead (lead oxide), lead chromate, mercuric sulphide, and copper arsenite.² But the current range of permitted food additives, and the scale of their use, is much greater than it was in those days. Food additives can now be classed as colouring agents, preservatives, antioxidants, emulsifiers, stabilisers, flavours, sequestrants, anticaking agents, acids, buffers, bases, humectants, firming agents, crisping agents, thickeners, sweeteners, enzymes, and nutritive agents. Evidence linking most of these with disease states is lacking, but certain colouring agents and preservatives do have definite adverse effects in certain people. The substances most commonly blamed are azo dyes such as tartrazine, and preservatives such as benzoic acid and related compounds and the sulphites.

Urticaria

Most accounts of urticaria provoked by food additives are technically unsound, but two good double blind placebo controlled studies have appeared.^{3,4} Both were of patients with chronic urticaria, defined as lasting two months or more, who were attending allergy clinics, and who had responded to a diet avoiding colouring agents and preservatives. Tartrazine provoked attacks of urticaria in about a quarter

of these patients. One of these studies showed that sunset yellow, amaranth, indigo carmine, sodium benzoate, sodium metabisulphite, and monosodium glutamate could also provoke urticaria in childhood.³ It is reasonable to recommend that patients with chronic urticaria try a diet avoiding these additives, and doctors with a 'Sherlock Holmes' instinct can combine such a diet with a battery of double blind challenges so as to identify the causative substance.^{3,5} The prognosis for additive induced urticaria in childhood seems to be good, and in a recent study three quarters of a small group of children grew out of the problem within one to five years.⁶ What is as yet unclear is whether this spontaneous improvement represents a development of tolerance towards the additive or a loss of the urticarial state. The latter is more likely, as it has been shown that urticarial reactions to tartrazine and salicylates mainly occur when the disease itself is active.⁷

Asthma and atopic eczema

It is a common though poorly documented observation that orange squash, lemon and barley water, and similar drinks which rely heavily for their appearance and flavour upon artificial ingredients, can precipitate coughing and wheezing in some children with asthma. It is not always easy to unravel the causative ingredient, for these reactions can be caused by tartrazine,⁸ sodium benzoate,⁹ cola,¹⁰ and probably most common of all, sulphur dioxide.⁹ The cold temperature of the drink can also be responsible.¹⁰ I would estimate that in addition, based on unpublished observations of 500 children with severe atopic eczema, the ingestion of tartrazine or benzoic acid may exacerbate the skin lesions in at least 5% of all children with atopic eczema. It is unclear whether additives aggravate eczema by producing urticaria, which seems the most likely explanation, or whether they are directly capable of worsening eczema.

Mechanism

The mechanism of action of additives such as tartrazine in triggering urticaria or atopic disease is uncertain. Most evidence suggests that the action is pharmacological rather than immunological,¹¹ and a recently published study showed rises in plasma

histamine concentrations after ingestion of 200 mg tartrazine.¹² It is unclear whether the findings in this study of normal subjects, which employed doses of tartrazine well above the average daily intake, necessarily explain the mechanism of action of smaller quantities in the clinical situation.

Behaviour

The avoidance of additives seems to have only a very short lived beneficial effect on behaviour problems, and both hospital¹³ and community based¹⁴ double blind studies have repeatedly failed to show any validity in the idea that additives cause behavioural problems in otherwise healthy people. A major source of confusion has been the presence of atopic disease. If an additive makes eczema or asthma worse, the concentration span and behaviour may also be expected to suffer, but there is no evidence that this is anything other than an indirect effect.

Public misinformation

The passion for food that is natural is not new. By the late 1850's, 'pure and unadulterated' had become the stock advertising slogan of those anxious to cash in on the then newly awakened fears of the public.² The recent obsession with natural food ignores the wide range of naturally occurring toxins. Examples are oxalic acid in rhubarb; goitrogens in brassicas; cyanogens in almonds, tapioca, and lima beans; 5-hydroxy tryptamine in bananas; psoralens in celery, peas, and parsley; solanine in potatoes; myristicin in nutmeg and carrots; and lectins in red kidney beans.¹⁵ The concept of a 'health food' shop is misleading. For example, a recent survey of 'crunchy' peanut butter showed that 11 out of 59 samples from health food producers contained over 100 µg/kg of aflatoxins, over 10 times the proposed maximum permitted level for total aflatoxins.¹⁶ Only one of the 26 samples from other producers contained aflatoxins in excess of 10 µg/kg, and none contained more than 50 µg/kg.

Food arouses not only the appetite but also the emotions. Current misinformation is attributable to numerous alarmist books, uncritical coverage by the media, and misguided advice by health care professionals. The avoidance of all foods containing additives, regardless of the fact that some are naturally occurring substances such as ascorbic acid, is widespread but illogical. There is an understandable desire of parents to focus the blame on a chemical rather than to face up to other causes for

their child's bad behaviour or to the fact that the cause is not known. At present the major problem with food additives is the level of public misinformation about the subject, which often leads to inappropriate and occasionally handicapping dietary restriction.¹⁷

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